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Title: Manipulator report for Pacific Northwest 2016

Author(s): Lawton, Cindy M.

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Los Alamos NATIONAL LABORATORY EST. 1943

Memorandum

Industrial Hygiene and Safety – Institutional Programs

To/MS:

From/MS: Cindy Lawton, IHS-IP Ergonomics, and E500

Phone: 7- 0252

Date: March 23, 2009

Subject: Manipulators

Summary

An initial ergonomic evaluation of the manipulators in was performed in 2007 and again in 2008. Discussion and solution development was performed with the new management team, FLM, and the employee on March 23, 2009. The purpose of this evaluation was to identify improvements to reduce stress and risk of injury to the employees. The primary ergonomic-related risk factors identified include static and awkward postures especially for the wrist, and repetitive motion of fine motor musculature of the hand and forearm depending on the work load.

This memorandum is intended as a starting point to reduce the ergonomic-related risk factors present in this process. All risk factors were probably not identified during this initial evaluation due to limited task demonstrations. The solution development and implementation process is a team effort. The Ergonomics Team provides technical support and guidance; employees demonstrate tasks, provide ideas, and test and provide feedback on potential solutions; and management provides the resources and encourages participation in the process.

Specific Issues & Recommendations:

ISSUES	**ACTIONS/RECOMMENDATIONS**
1. Awkward postures for the wrist, shoulder, and fingers 2. Excessive and repetitive force to perform tasks 3. Prolonged static posture	**Manipulators**: Working with manipulators requires repetitive motion with fine motor control. Unfortunately, engineering controls are very limited and difficult to implement in a timely fashion thus administrative controls must be implemented to reduce the risk to the employees. • **Engineering Controls**: - **Automation** of the processes will help reduce the workload for the employees. Each process should be looked at specifically to see if automation is a possibility. - **Manipulator design**: Several different types of manipulators are available on the market which may or may not reduce the strain to the forearm/hand muscles.

Static posture standing	Specifically, manipulators that utilize the index and thumb should be considered vs. the fourth and fifth finger for operation. The thumb and index finger both have more muscles that innervate it thus fatigue will be slower than a manipulator which utilizes the $4^{th}/5^{th}$ finger for operation. Savannah River (SRNL) has many manipulators and I suggest visiting their site or contacting them to discuss type as well as injury rates. - **Antifatigue Matting:** The new ergo kneel anti-fatigue mats are available on JIT to help reduce lower back and leg fatigue while standing. • **Administrative Controls:** - **Time:** At present, the amount of time that an individual can safely perform manipulator work is not available in the research. However, pipetting has been studied extensively by ergonomists which utilizes the same fine motor control. Presently, the recommended time limits for pipetting are: 6hrs/week and less than 300 hrs/year. My understanding of the manipulator processes in this area is that the work load increases significantly for several weeks and then is reduced. I recommend manipulator work time should not exceed four hrs/day – two hours per morning and two hours in the afternoon. This may require training/hiring more employees in order to meet the work load demand. - **Exercise:** A class demonstrating exercises should be provided to the workers. Posters should be provided in the manipulator area as reminders to the workers to perform the exercise as well as the time to do the exercises. 1. Warm Up: Proper warm-up will increase circulation to the forearm and hand muscles which will reduce the risk of injury. Recommended warm up is on the UBE for 5 minutes prior to working with the manipulators. 2. Stretching: The forearm muscles will tighten with regular

	manipulator work. Workers should do both the wrist flexor and extensor stretch 3 – 5 times/ day. 3 – 5 repetitions each time holding each stretch 10 – 15 seconds. The stretches should definitely be performed prior to starting manipulator work. 3. Strengthening: The shoulder is at risk with manipulator work because of the necessity of working and holding the manipulator above 70 degrees of elevation. The rotator cuff should be strengthened 3 times per week utilizing the therabands. - **Body Mechanics**: Proper body mechanics while working should be incorporated. Utilize two hands on the manipulator as much as possible. This will share the load between both arms. Be aware and try to reduce movements of the shoulder above 70 degrees of elevation. Shorter workers may need a platform. - **Task Rotation**: Different manipulator stations are more "intense" than others. This will cause more stress to the employees performing these tasks causing increase muscular tightness and fatigue both which can lead to injury. Recommendation is to train all manipulator workers to perform easy and difficult tasks. This will allow rotation between manipulator stations. Once trained, a regular rotation schedule should be developed. Consider Bio-feedback to help reduce stress to employees which is offered by the Occupational Medicine department.